also giving financial assistance to the Great Lakes Institute of the University of Toronto.

The Department of Energy, Mines and Resources

The department's Marine Sciences Branch has the prime responsibility for Canada's effort in defence oceanography, arctic oceanography and deep-ocean studies.

At present, most of the department's oceanographic activities are carried out by its Atlantic Oceanographic Group at the Bedford Institute at Dartmouth, N.S. However, in line with its greatly expanded responsibilities in oceanography, the department plans the establishment of an Institute on the West Coast similar to the Bedford Institute on the Atlantic Coast.

The department has formed an Inland Waters Branch specifically for the study of the distribution and potential of fresh-water resources in Canada. The initial emphasis will be on the pressing problems of pollution and discharge characteristics of the Great Lakes. As the program develops, all aspects of limnology and engineering of the lakes will be investigated.

Training in Oceanography

Training programs in the various disciplines of oceanography are given to well qualified university graduates with an honors degree in one of the physical or natural sciences, including mathematics, at three universities: the Institute of Oceanography, University of British Columbia, Vancouver, B.C.; the Institute of Oceanography, Dalhousie University, Halifax, N.S.; and the Marine Sciences Centre, McGill University, Montreal, P.Q. The Great Lakes Institute of the University of Toronto carries out limnological investigations on the Great Lakes.

Fellowship support is ordinarily provided during graduate training.

Students interested in pursuing a career in marine research should contact the head of their department for advice, or write directly to one of the above-named marine institutes.

Salaries

Salaries of graduates in the physical sciences in the government service are usually increased annually and adjusted periodically by cyclical review. They are normally competitive with those offered by other Canadian employers.

Benefits

The benefits are many and varied. Subject to change by collective bargaining, they include 10 holidays a year plus three weeks vacation; 15 days of sick leave annually, which, if unused, accumulates from year to year; enrollment in one of the most comprehensive superannuation plans in Canada, under which a pension can be as much as 70 per cent of the average salary over a six-year period of highest earnings; low-cost term insurance, and, if desired, enrollment in an excellent surgical-medical plan.

How To Apply

Recruiting teams visit Canadian universities from coast to coast during November, December and January of each year. Details of interview dates and locations, and application forms are available from your Placement Officer. Bulletin board announcements of these dates are also displayed on the campus in late fall.

Further information about positions available in the Department of Energy, Mines and Resources may be obtained from Mr. R.B. Code, Director, Personnel and Organization, Department of Energy, Mines and Resources, 588 Booth Street, Ottawa, Ontario and for the Fisheries Research Board of Canada from Dr. J.S. Willmer, Personnel Consultant, Fisheries Research Board, Sir Charles Tupper Building, Confederation Heights, Ottawa, Ontario.

Summer Employment

The government service begins its search for prospective employees long before they graduate. Each summer it employs students to work in its departments. In the field and the laboratory they become an integral part of staff and make a valuable contribution to departmental engineering and scientific activities. In most instances, the students receive travel assistance.

For further information and application forms, contact your University Placement Office. Please note that applications must be submitted before the last day of January.

Careers in Oceanography

MARINE SCIENCES BRANCH
Department of Energy, Mines and Resources,
Ottawa, Canada

J. J. Greene, Minister
C. M. Isbister, Deputy Minister

Careers in Oceanography

Are you interested in OCEANOGRAPHY — one of the most challenging and rewarding sciences in the world today?

If so, the Government of Canada has need of your services. It requires oceanographers — physicists, chemists, marine geologists, geophysicists, biologists and mathematicians — to carry out a greatly expanded program of oceanographic research designed to gain much needed information on Canada's surrounding waters.

Canada has a major interest in the sea, bounded as it is on the north, east and west by different oceans and possessing one of the world's longest coastlines and some of its greatest expanses of continental shelves. Because of the growing importance of the sea to the industrial and social progress of Canada, the federal government has increased its emphasis on oceanographic research to provide much needed information on the country's coastlines, its coastal waters and its continental shelves.

The Department of Energy, Mines and Resources is the federal agency primarily responsible for meeting Canada's need for oceanographic and tidal research on the country's coastal waters and for limnological investigations of its inland waters. The department is building up a research group of high scientific calibre, supported by modern ship and shore facilities and a skilled technical staff.

What is Oceanography?

In its broadest sense, oceanography can be defined as the study of the sea; it thus includes not only research into the characteristics of the sea water itself, but an examination of the boundaries of the ocean, the shape of its coastlines, the nature of the ocean floor and the interaction of the sea surface with the air above it. Oceanographic studies are not confined to the physical properties alone, but include research on the complicated chemical processes in the sea and biological investigations of the variety of life which the sea and its extensive floors support.

Limnology is the scientific study of fresh waters.

Physical oceanographers study the physical state of the sea, including its variations in both time and space, in order to formulate the physical processes occurring in the ocean and predict aspects of the sea's behavior. They are primarily interested in measuring the physical parameters of the ocean, in describing the distribution and variability of these parameters and designing models leading to the prediction of the character of water masses and motion in the ocean.

Chemical oceanographers apply chemical techniques, laws and principles to the study of the ocean. They are devoted to the accurate description of the chemical nature of the seas, to the investigation of the processes that produce and alter the chemical characteristics of the ocean and the effect of the chemical composition of sea water on the biological, geological and physical processes of the marine environment.

Marine geologists and geophysicists study the geology of the sea floor and investigate the structure of the earth's crust beneath the oceanic depressions. They employ the methods of geology and geophysics to study the material and form of the sea floor and the underlying structure and relate these observations to the processes that form the ocean basins.

Marine biologists study the food chain involved in the production of commercially important fisheries in the oceans. They are concerned with the investigation of all aspects of the populations of the ocean and the relationships of these life forms to the salt water environment.

Oceanography in Canada

Canada's early interest in the sea centered on the sounding and the charting of Canadian waters by the Canadian Hydrographic Service and oceanographic studies to assist the fishing industry by the Fisheries Research Board of Canada. For many years, the Fisheries Research Board carried on a gradually expanding oceanographic program. In more recent years, other federal agencies have become involved in various aspects of oceanography: the Department of Energy, Mines and Resources, the Department of National Defence, the Department of Transport and the National Research Council.

The activities of these agencies are coordinated by the Canadian Committee on Oceanography, which ensures that all Canadian oceanographic resources are used to best advantage to provide a well-rounded oceanographic program.

Fisheries Research Board

The Fisheries Research Board supports a strong program of oceanographic research, which is carried out by its Pacific and Atlantic Oceanographic Groups at Nanaimo, British Columbia, and Halifax, Nova Scotia; the Arctic Unit at Montreal, Quebec, the Biological Stations at St. John's, Newfoundland, St. Andrew's, New Brunswick, and Nanaimo, and the Marine Ecology Laboratory at Dartmouth, Nova Scotia. The Board has also established a Freshwater Institute in Winnipeg, Manitoba, for studies of eutrophication and biological problems in Canada's fresh-water lakes.

The Department of National Defence

The Department of National Defence is concerned with the influence of oceanographic conditions on the effectiveness of Canada's maritime defence. The Defence Research Board, the research organization of the Department of National Defence, is primarily interested in the problems of maritime warfare, especially those related to submarine operations.

The Department of Transport

The Department of Transport is involved in oceanography through two of its Services. Its Meteorological Service is concerned with the influence of the oceans on weather and is responsible for ice forecasting on the east coast and in the Arctic. This service relies heavily on oceanographic research by other agencies to improve its capabilities in this activity. The department's Marine Services Division enables federal oceanographers to undertake observations from vessels of its fleet, including the icebreakers operating in Canada's northern waters.

The National Research Council

The National Research Council is playing an important role in the development of oceanographic research in Canada through grants and scholarships. It awards grants to the Institute of Oceanography at the University of British Columbia, the Institute of Oceanography at Dalhousie University, and the Marine Sciences Centre at McGill University to assist in the training of oceanographers and to carry out some fundamental aspects of oceanographic research. It is

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